

CONNECTICUT RIVER BASIN
MIDDLETOWN, CONNECTICUT

UPPER MILL POND DAM
CT 00141

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS

January, 1981

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number) DAMS, INSPECTION, DAM SAFETY, Conn. River Basin Middletwon, Conn. Upper Mill Pond Dam		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) UPper Mill Pond Dam is a stone masonry dam approx. 100 ft. long and 15 ft. high. The spillway is 92 ft. long, 9 ft. wide and consists of a masonry broad crested weir. The overall condition of the dam is FAIR. The structural stability of the dam is good as evidenced by its vertical, horizontal and lateral alignment.		

STORCH ENGINEERS

161 MAIN STREET, WETHERSFIELD, CONNECTICUT 06109

(203) 529-7727

January 28, 1981

Mr. E. P. Gould
Department of the Army
New England Division
Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Subject: Dam Inspection Program
Upper Mill Pond Dam
Middletown, Connecticut

Dear Mr. Gould:

Following the field inspection and hydraulic/hydrologic analysis of the subject dam, we conclude that the dam should be reclassified as having a LOW hazard potential.

Please find attached a brief report substantiating our findings.

Very truly yours,

STORCH ENGINEERS


Gary J. Giroux, P.E.

GJG:11
Attachment

UPPER MILL POND DAM

CT 00141

CONNECTICUT RIVER BASIN

MIDDLETOWN, CONNECTICUT

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

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NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

Identification Number:	CT 00141
Name:	Upper Mill Pond Dam
Town:	Middletown
County and State:	Middlesex County, Connecticut
Stream:	Sumner Brook
Date of Inspection:	October 22, 1980
Owner/Operator:	Fenner America LTD. 400 East Main Street Middletown, Connecticut 06457

DESCRIPTION

Upper Mill Pond Dam is a stone masonry dam approximately 100 feet long and 15 feet high. The spillway is 92 feet long, 9 feet wide and consists of a masonry broad crested weir. The west abutment is a 3-foot high concrete wall and the east abutment is a 1-foot high irregularly shaped concrete platform. A concrete outlet structure with a bar rack is at the edge of the pond adjacent to the east abutment. A 12-inch low-level discharge pipe passes through the dam below the east abutment at 7.5 feet above the toe of the dam. Plan, section and elevation views of the dam are contained in Appendix B.

Upper Mill Pond Dam was constructed around 1900 and was originally used to supply power to the downstream mill. Today, the dam is used for recreational purposes only. The water level is at the spillway crest and can be lowered by opening the low-level discharge gate which was recently made operable by the Middletown Water Department. No specific maintenance program exists for this dam. No design or construction information is available for the dam.

In general, the overall condition of the dam is FAIR. A copy of the visual inspection check list and selected photos are contained in Appendix A and C respectively. The structural stability of the dam is good as evidenced by its vertical, horizontal and lateral alignment. The stone masonry is in good condition although

moss and weeds are growing from the joints. The spillway weir and east abutment are in good condition. The west abutment is badly spalled at its base. The discharge gate inlet structure is badly spalled and the bar rack is cluttered with debris. There is some seepage at the east end of the dam where the stone masonry meets the abutment/ledge interface. Vegetation is growing around this area as well. The ledge continues along the downstream channel bank and there is minor seepage.

A drainage pipe outlets above the west abutment. There is presently a scour hole at this location. This scour hole has caused the last section of the drainage pipe to collapse into the hole and is undermining the west spillway abutment.

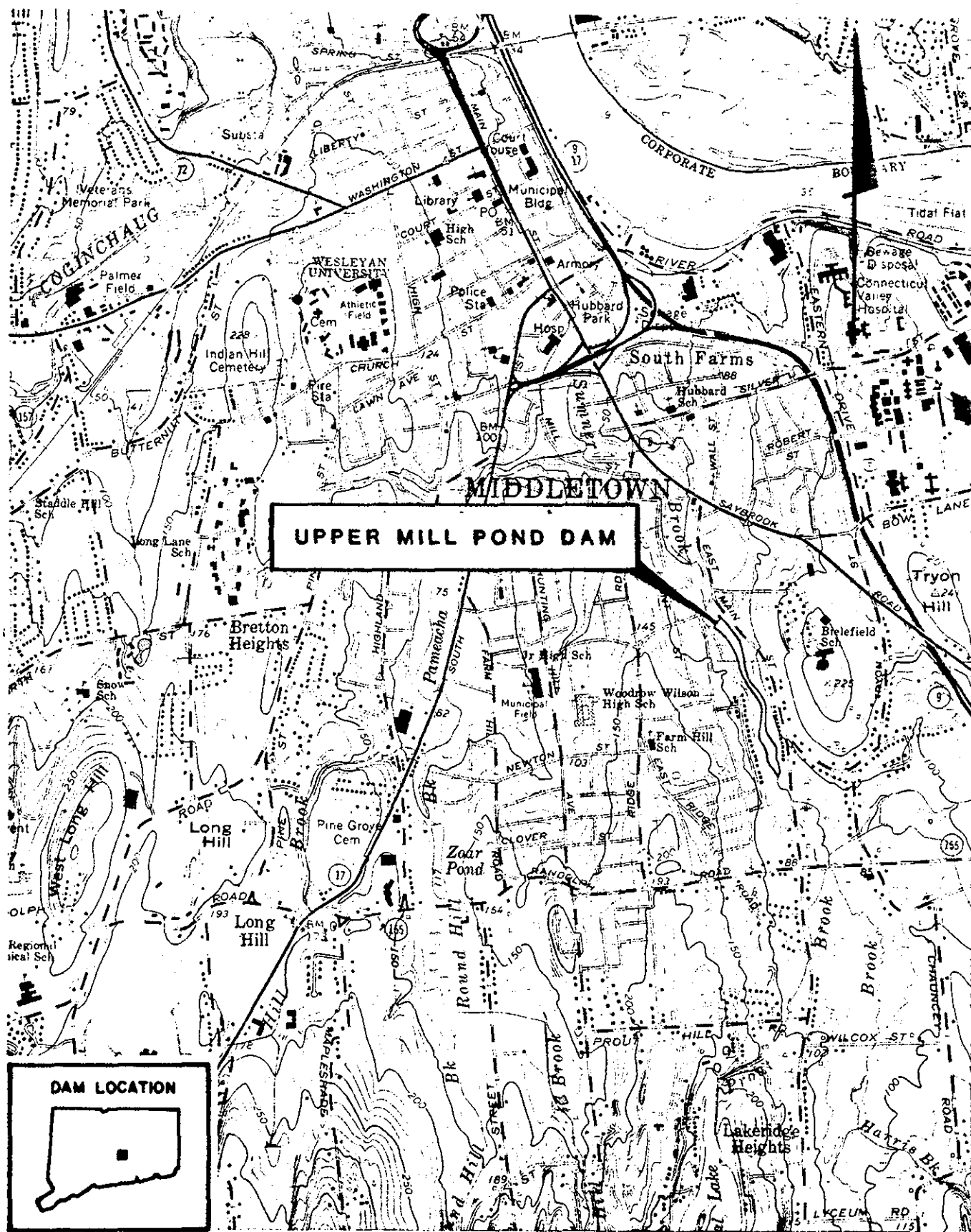
EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

The watershed of Upper Mill Pond Dam encompasses 7.6 square miles of rolling topography that is 25 percent developed. At the spillway elevation, the water surface area and storage capacity is 5 acres and 31 acre-feet respectively. The storage capacity when the water level is at the top of the dam is 36 acre-feet. With a maximum height of 15 feet and a maximum storage capacity of 36 acre-feet, Upper Mill Pond Dam is classified as SMALL in accordance with the Corps of Engineers' Recommend Guidelines for Safety Inspection of Dams.

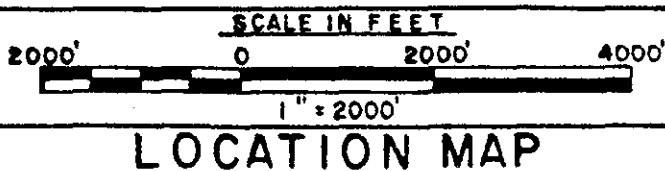
A dam failure analysis was performed using the Rule of Thumb method in accordance with guidelines established by the Corps of Engineers. Failure was assumed to occur when the water level in the pond was at the top of the dam. The calculated dam failure discharge is 3,610 cfs. The flood waters were routed through the downstream reaches. Nowhere along the river reach will the failure floodwave endanger human life or cause appreciable property damage. Therefore, the dam is classified as LOW hazard potential in accordance with the guidelines mentioned above.

5

The test flood for this dam ranges from the 50 year flood to the 100 year flood, with the 50 year flood being used because the dam's small size. The test flood inflow is 1,250 cfs and the routed test flood outflow is 1,200 cfs. The spillway capacity when the water level in the pond is at the top of the dam is 250 cfs. The test flood will overtop the dam by 1.8 feet. Hydraulic and hydrologic computations are contained in Appendix D.



US ARMY, CORPS OF ENGINEERS
NEW ENGLAND DIVISION
WALTHAM, MASS.



APPENDIX A
INSPECTION CHECK LIST

INSPECTION CHECK LIST

PARTY ORGANIZATION

PROJECT Upper Mill Pond Dam

DATE 10/22/80

TIME 9:30 a.m.

WEATHER Sunny, 50's

W.S. ELEV. _____ U.S. _____ DN.S. _____

PARTY:

- | | |
|---|---|
| 1. <u>Gary Giroux, S.E., Hyd./Struct.</u> | 6. <u>Michael Pozzato, MA, Mechanical</u> |
| 2. <u>Hermann Hani, S.E., Technician</u> | 7. _____ |
| 3. <u>Ben Cohen, S.E., Civil</u> | 8. _____ |
| 4. <u>Floyd Austin, DBA, Civil</u> | 9. _____ |
| 5. <u>Peter Austin, DBA, Civil</u> | 10. _____ |

PROJECT FEATURE	INSPECTED BY	REMARKS
1. <u>Dam Embankment</u>	F. Austin P. Austin	Fair
2. <u>Mechanical</u>	M. Pozzato	Fair
3. <u>Spillway</u>	G. Giroux B. Cohen	Good
4. <u>Discharge Channel</u>	G. Giroux H. Hani	Good
5. _____	_____	_____
6. _____	_____	_____
7. _____	_____	_____
8. _____	_____	_____
9. _____	_____	_____
10. _____	_____	_____

INSPECTION CHECK LIST**PROJECT** Upper Mill Pond Dam**DATE** 10/22/80**PROJECT FEATURE** _____**NAME** _____**DISCIPLINE** _____**NAME** _____

AREA EVALUATED	CONDITIONS
<u>DAM EMBANKMENT</u>	
Crest Elevation	75 (NGVD)
Current Pool Elevation	74.1 (NGVD)
Maximum Impoundment to Date	Unknown
Surface Cracks	None (masonry dam)
Pavement Condition	N/A
Movement or Settlement of Crest	None
Lateral Movement	None
Vertical Alignment	Good
Horizontal Alignment	Good
Condition at Abutment and at Concrete Structures	Concrete spalled at west abutment
Indications of Movement of Structural Items on Slopes	None
Trespassing on Slopes	Some
Vegetation on Slopes	Brush and small trees
Sloughing or Erosion of Slopes or Abutments	Some near west abutment and along east bank of downstream channel
Rock Slope Protection - Riprap Failures	N/A
Unusual Movement or Cracking at or Near Toes	None observed
Unusual Embankment or Downstream Seepage	Substantial at east embankment
Piping or Boils	None
Foundation Drainage Features	None
Toe Drains	None
Instrumentation System	None

INSPECTION CHECK LIST**PROJECT** Upper Mill Pond Dam**DATE** 10/22/80**PROJECT FEATURE** _____**NAME** _____**DISCIPLINE** _____**NAME** _____**AREA EVALUATED****CONDITION****CUTLET WORKS - INTAKE CHANNEL AND
INTAKE STRUCTURE****a. Approach Channel**

Underwater

Slope Conditions

Bottom Conditions

Rock Slides or Falls

Log Boom

Debris

Condition of Concrete Lining

Drains or Weep Holes

b. Intake Structure

Condition of Concrete

Fair - significant spalling

Stop Logs and Slots

Bar rack clogged with debris

INSPECTION CHECK LIST

PROJECT Upper Mill Pond Dam

DATE 10/22/80

PROJECT FEATURE _____

NAME _____

DISCIPLINE _____

NAME _____

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - CONTROL TOWER</u></p> <p>a. Concrete and Structural</p> <p>General Condition</p> <p>Condition of Joints</p> <p>Spalling</p> <p>Visible Reinforcing</p> <p>Rusting or Staining of Concrete</p> <p>Any Seepage or Efflorescence</p> <p>Joint Alignment</p> <p>Unusual Seepage or Leaks in Gate Chamber</p> <p>Cracks</p> <p>Rusting or Corrosion of Steel</p> <p>b. Mechanical and Electrical</p> <p>Air Vents</p> <p>Float Wells</p> <p>Crane Hoist</p> <p>Elevator</p> <p>Hydraulic System</p> <p>Service Gates</p> <p>Emergency Gates</p> <p>Lightning Protection System</p> <p>Emergency Power System</p> <p>Wiring and Lighting System in Gate Chamber</p>	<p>N/A</p> <p>Operable</p>

INSPECTION CHECK LIST

PROJECT Upper Mill Pond Dam

DATE 10/22/80

PROJECT FEATURE _____

NAME _____

DISCIPLINE _____

NAME _____

AREA EVALUATED

CONDITION

OUTLET WORKS - TRANSITION AND CONDUIT

N/A

General Condition of Concrete

Rust or Staining on Concrete

Spalling

Erosion or Cavitation

Cracking

Alignment of Monoliths

Alignment of Joints

Numbering of Monoliths

INSPECTION CHECK LIST

PROJECT Upper Mill Pond Dam

DATE 10/22/80

PROJECT FEATURE _____

NAME _____

DISCIPLINE _____

NAME _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u>	
a. Approach Channel	
General Condition	Unknown - underwater
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	Some small trees
Floor of Approach Channel	Underwater
b. Weir and Training Walls	
General Condition of Concrete	Poor at west abutment. Good at east abutment
Rust or Staining	None
Spalling	Significant spalling at west abutment
Any Visible Reinforcing	None
Any Seepage or Efflorescence	Some at east abutment
Drain Holes	None
c. Discharge Channel	
General Condition	Good
Loose Rock Overhanging Channel	Ledge on east bank severely undermined
Trees Overhanging Channel	Some small trees
Floor of Channel	Large rocks, bedrock some brush
Other Obstructions	

INSPECTION CHECK LIST

PROJECT Upper Mill Pond Dam

DATE 10/22/80

PROJECT FEATURE _____

NAME _____

DISCIPLINE _____

NAME _____

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL</u></p> <p>General Condition of Concrete</p> <p>Rust or Staining</p> <p>Spalling</p> <p>Erosion or Cavitation</p> <p>Visible Reinforcing</p> <p>Any Seepage or Efflorescence</p> <p>Condition at Joints</p> <p>Drain holes</p> <p>Channel</p> <p>Loose Rock or Trees Overhanging Channel</p> <p>Condition of Discharge Channel</p>	<p>N/A</p> <p>Outlet pipe discharge into spillway channel</p>

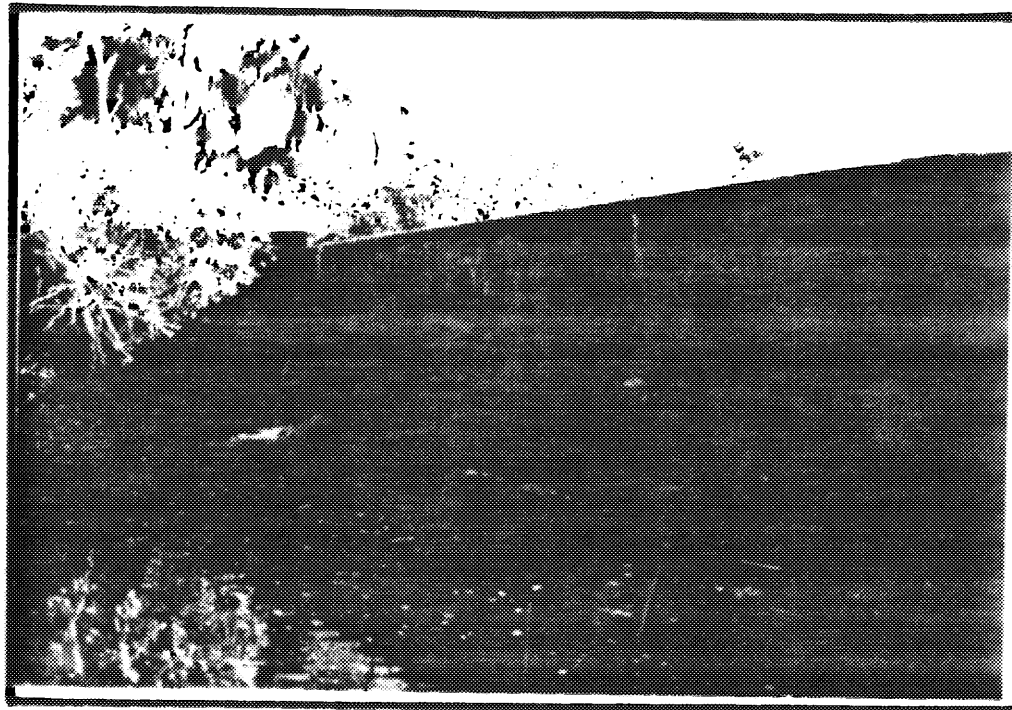
APPENDIX B
ENGINEERING DATA

Any information pertaining to the history, maintenance and past inspection reports are located at:

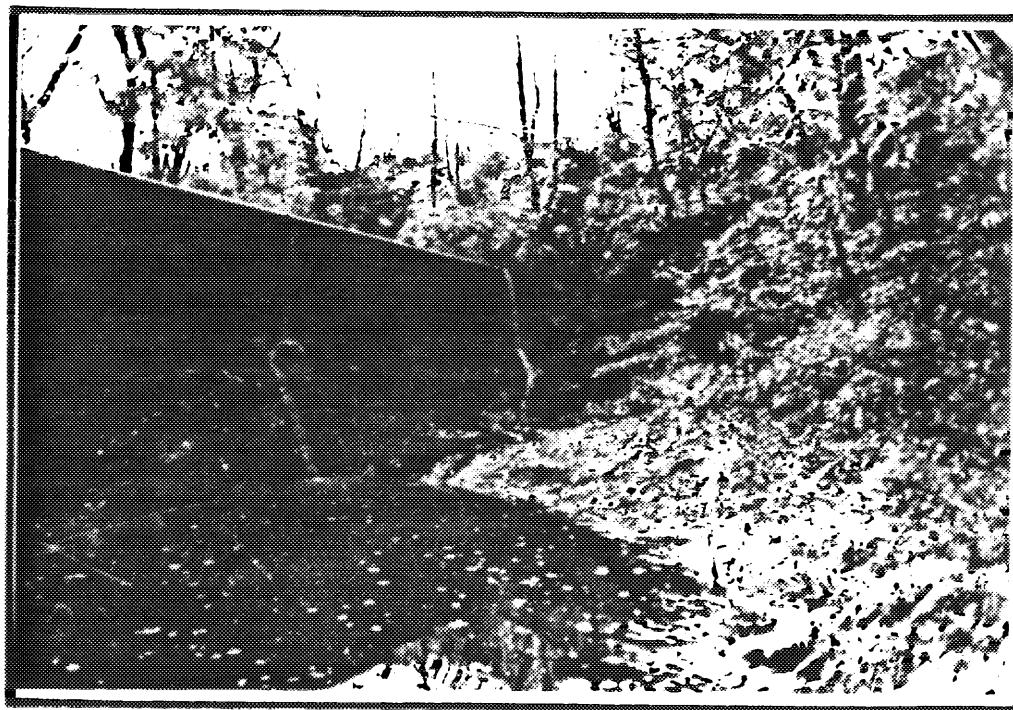
State of Connecticut
Department of Environmental
Protection
Water Resources Unit
State Office Building
Hartford, Connecticut 06115

APPENDIX C

PHOTOGRAPHS



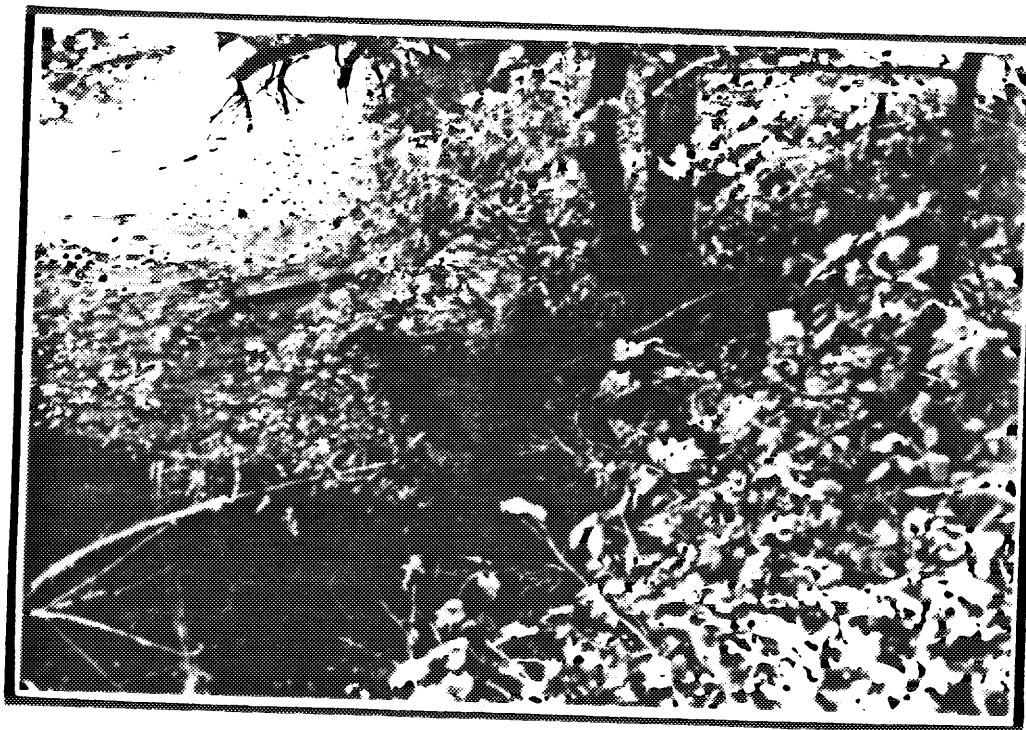
UPPER MILL POND DAM



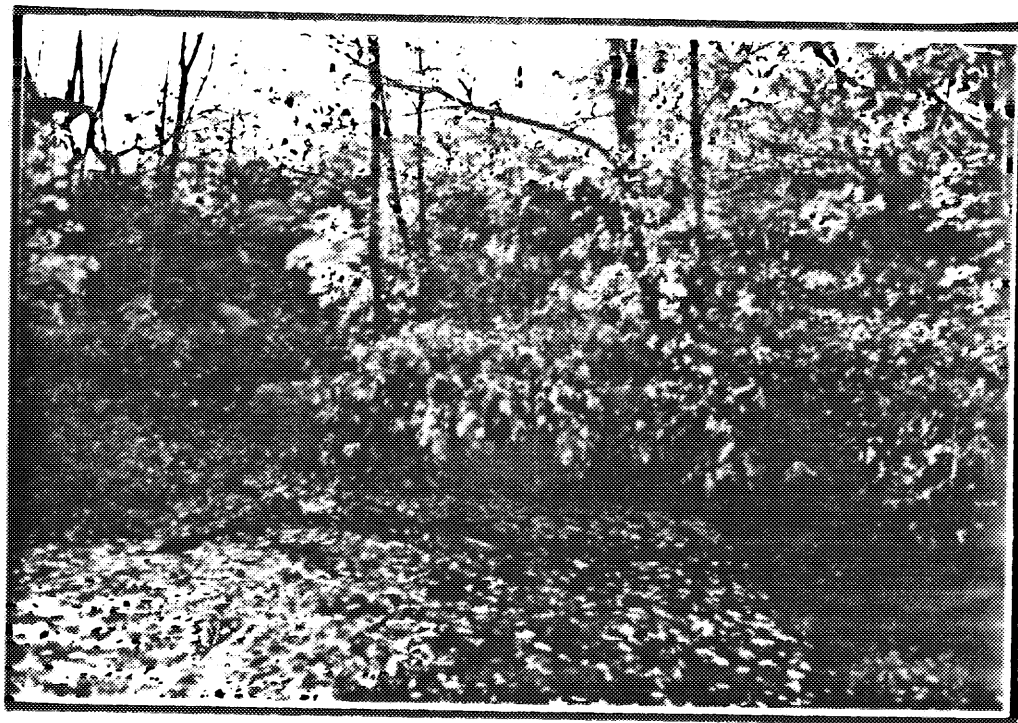
WEST ABUTMENT



SPILLWAY - EAST ABUTMENT



TRAINING WALL - WEST ABUTMENT

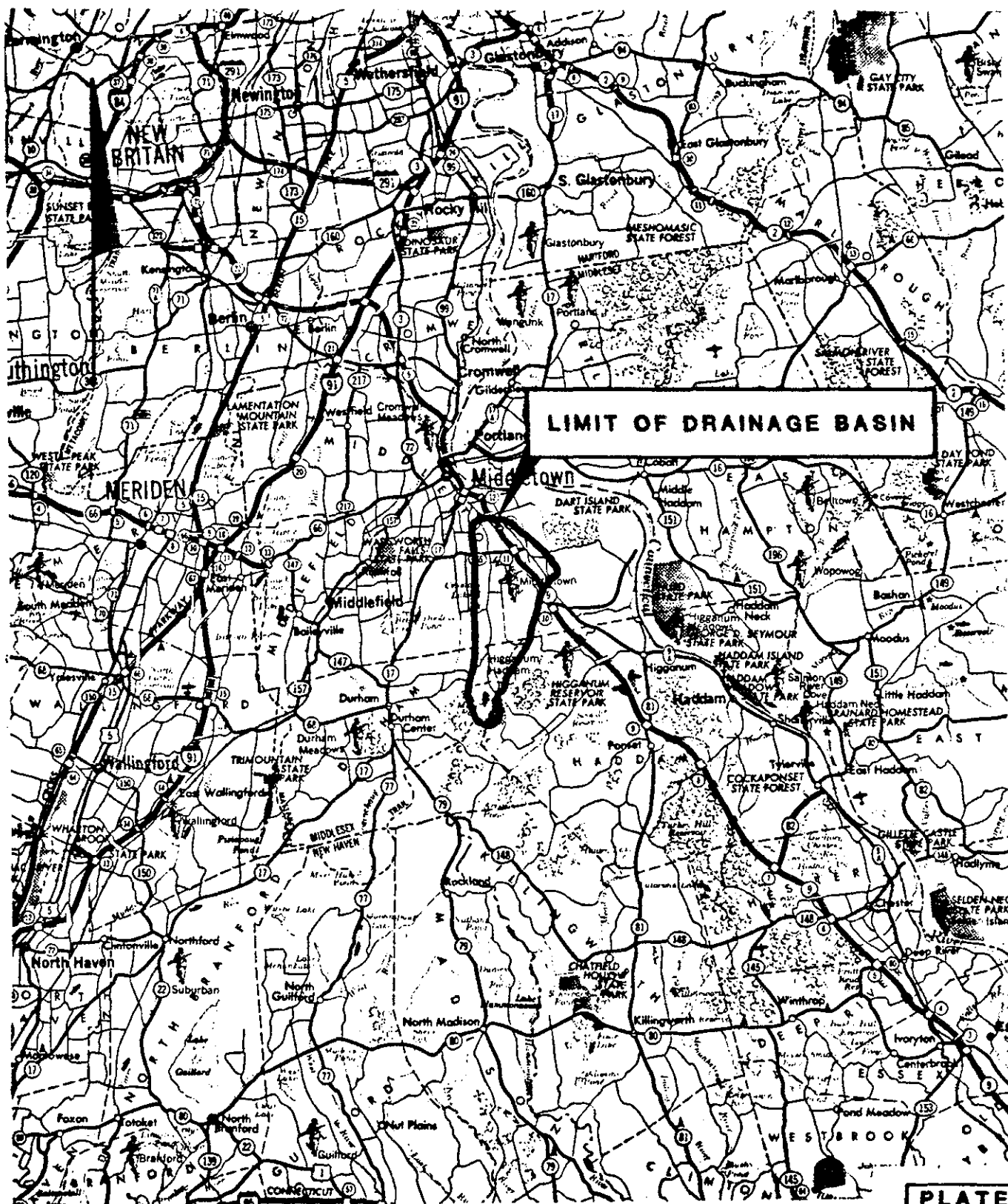


TRAINING WALL - WEST ABUTMENT - DRAINAGE PIPE



DOWNSTREAM CHANNEL

APPENDIX D
HYDRAULIC/HYDROLOGIC COMPUTATIONS



LIMIT OF DRAINAGE BASIN

PLATE 2

STORCH ENGINEERS
WETHERSFIELD, CONNECTICUT

U.S. ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

UPPER MILL POND DAM

1 in. = 3.5 mi.

SCALE: AS SHOWN
DATE JANUARY, 1981

STORCH ENGINEERS
Engineers - Landscape Architects
Planners - Environmental Consultants

JOB Phase I Dam Inspection - #4463
SHEET NO 1 OF 5
CALCULATED BY BDC DATE 1/9/81
CHECKED BY SG DATE 1/17/81

Determination of Test Flood

NAME OF DAM Upper Mill Pond Dam

DRAINAGE AREA 7.6 SM

INFLOW Size: Small

Hazard: Low

Test Flood: 50 year

$$Q = 252 A^{.79}$$
$$Q = 252 (7.6)^{.79} = 1250 \text{ cfs}$$

Estimating the effect of surcharge storage on the Maximum Test Flood

1. $Q_{p1} = 1250 \text{ cfs}$

2a. $H_1 = 2.9' \text{ (elev.)}$

b. $STOR_1 = 0.18''$

c. $Q_{p2} = Q_{p1} (1 - STOR_1 / 4.4) = 1200 \text{ cfs}$

3a. $H_2 = 2.8' \quad STOR_2 = .17''$

b. $STOR_A = .175''$

$$Q_{PA} = 1200 \text{ cfs}$$

$$H_A = 2.8'$$

$$STOR_A = .17''$$

Test Flood = 1200 cfs

Capacity of the spillway when the pond elevation is at the top of the dam

$$Q = 250 \text{ cfs or } 21\% \text{ of the Test Flood}$$

STORCH ENGINEERS
Engineers - Landscape Architects
Planners - Environmental Consultants

JOB Phase I Dam Inspection 4463

SHEET NO. 2 OF 5

CALCULATED BY RDC DATE 11/24/80

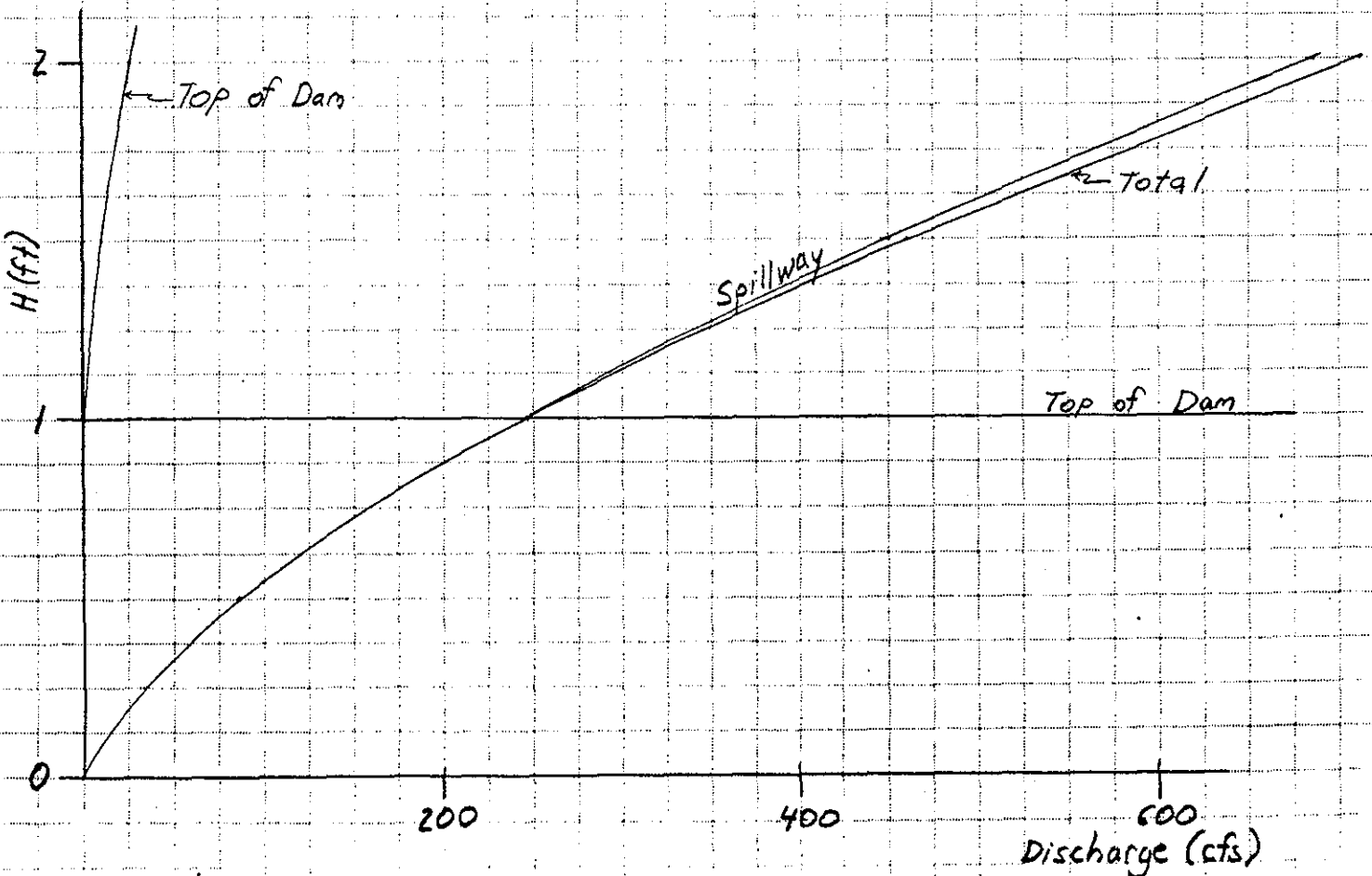
CHECKED BY FJG DATE 11/14/81

Stage Discharge

NAME OF DAM Upper Mill Pond Dam

$Q = CLH^{3/2}$

Elev	Spillway I				Spillway II				Dam				QT
	C	L	H	Q	C	L	H	Q	C	L	H	Q	
		92'	0	0									0
2.63			0.5	86									86
2.68			1.0	247						10'	0	0	247
2.66			1.5	450					2.70		0.5	10	460
2.64			2.0	687					2.63		1.0	26	713



STORCH ENGINEERS
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JOB Phase I Dam Inspection 4463

SHEET NO. 3 OF 5

CALCULATED BY BPC DATE 11/9/81

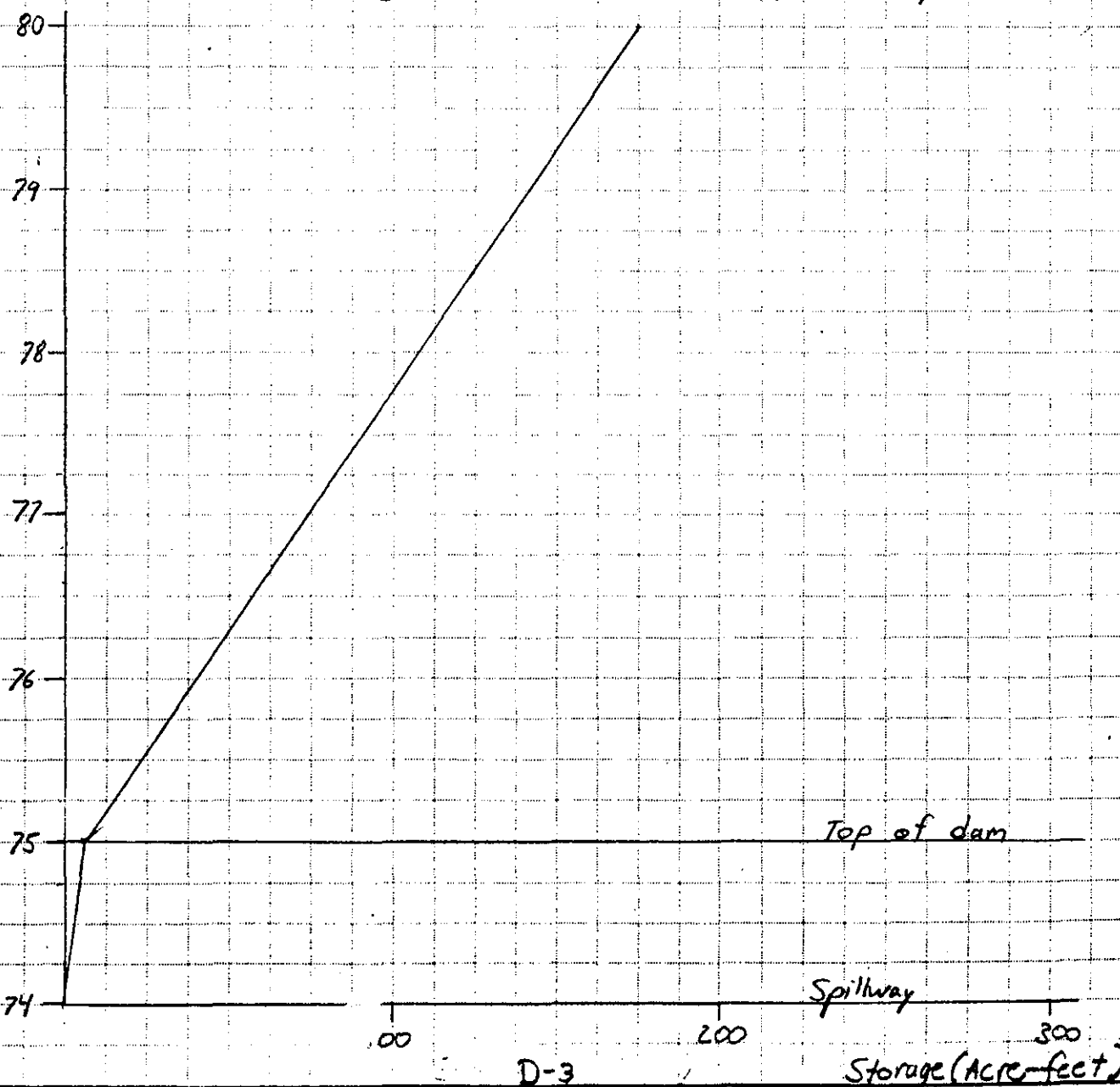
CHECKED BY G.J.G. DATE 11/15/81

AREA - CAPACITY

Name of Dam: Upper Mill Pond Dam

ELEV	DEPTH	AREA	AVG. AREA	VOL	Σ VOL
74		4.7			
	1.0		4.8	4.8	
75		4.9			4.8
	5.0		34.2	171.0	
80		63.4			175.8

Elev. (NGVD) Storage below spillway is approximately 31 Acft



D-3

Downstream Hydrographs

"Rule of Thumb" Guidance for Estimating Downstream Failure Hydrographs

NAME OF DAM Upper Mill Pond Dam

Section I at Dam

1. $S = \frac{36}{8/27 W_b \sqrt{g}} Y^{3/2} = 8/27 (37) \sqrt{32.2} (15)^{1.5} = 3,610 \text{ cfs}$
2. $Q_{p1} = 8/27 W_b \sqrt{g} Y^{3/2} = 8/27 (37) \sqrt{32.2} (15)^{1.5} = 3,610 \text{ cfs}$
3. See Sections

Section II at

- 4a. $H_2 = \underline{8.9'}$ $A_2 = \underline{510}$ $L_2 = \underline{190}$ $V_2 = \underline{2.2}$ Acft
- b. $Q_{p2} = Q_{p1} (1 - V_2/S) = \underline{3,390}$ cfs
- c. $H_2 = \underline{8.6'}$ $A_2 = \underline{490}$ $V_2 = \underline{2.2}$ Acft
 $A_A = \underline{500}$
 $Q_{p2} = 3,610 (1 - 2.2/36) = 3,390 \text{ cfs}$
 $H = 8.6'$

Section III at

- 4a. $H_3 = \underline{8.6'}$ $A_3 = \underline{490}$ $L_3 = \underline{80}$ $V_3 = \underline{0.9}$ Acft
- b. $Q_{p3} = Q_{p2} (1 - V_3/S) = \underline{3,305}$ cfs
- c. $H_3 = \underline{8.5'}$ $A_3 = \underline{470}$ $V_3 = \underline{0.9}$ Acft
 $A_A = \underline{480}$
 $Q_{p3} = 3,390 (1 - 0.9/36) = 3,305 \text{ cfs}$
 $H = 8.5'$

Section IV at

- 4a. $H_4 = \underline{\hspace{2cm}}$ $A_4 = \underline{\hspace{2cm}}$ $L_4 = \underline{\hspace{2cm}}$ $V_4 = \underline{\hspace{2cm}}$ Acft
- b. $Q_{p4} = Q_{p3} (1 - V_4/S) = \underline{\hspace{2cm}}$ cfs
- c. $H_4 = \underline{\hspace{2cm}}$ $A_4 = \underline{\hspace{2cm}}$ $V_4 = \underline{\hspace{2cm}}$ Acft
 $A_A = \underline{\hspace{2cm}}$
 $Q_{p4} = \underline{\hspace{2cm}}$

STORCH ENGINEERS - STORCH ASSOCIATES

Engineers - Landscape architects
Planners - Environmental Consultants

JOB Upper M. Pond Dam

SHEET NO. 5 OF 5

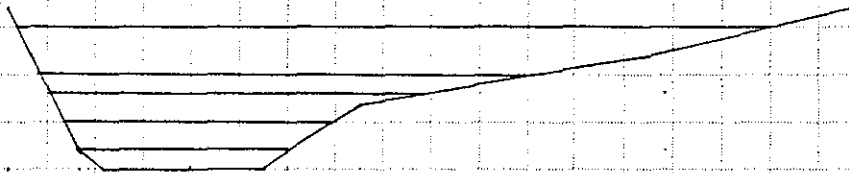
CALCULATED BY BDC DATE 11/21/80

CHECKED BY GJG DATE 11.25.81

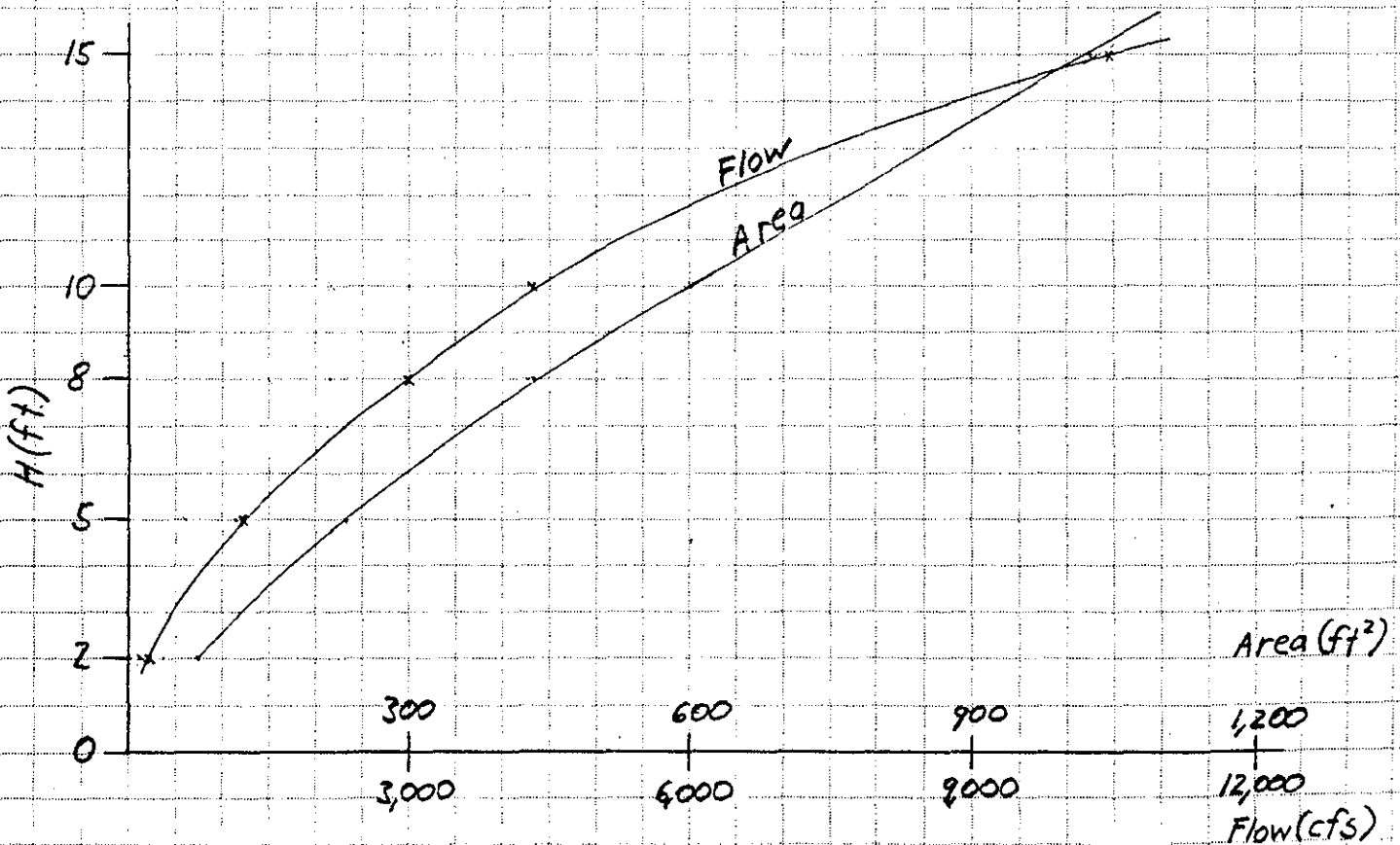
SCALE section II, III

$S = 1.14\%$
 $n = 0.075$

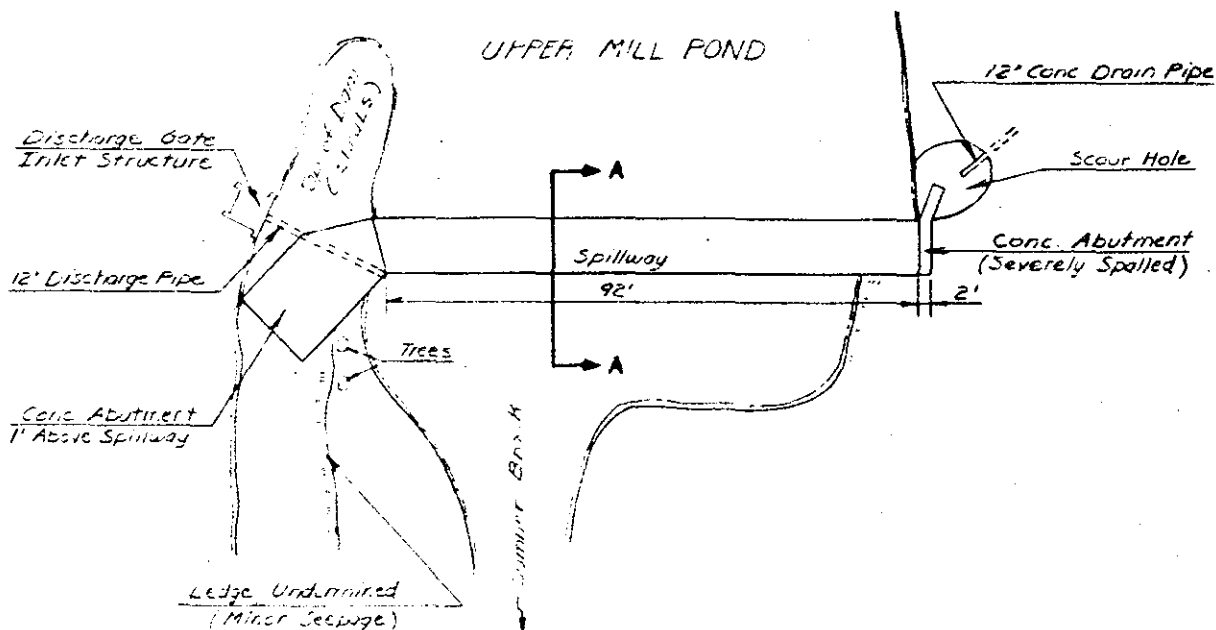
5' 1"
10'



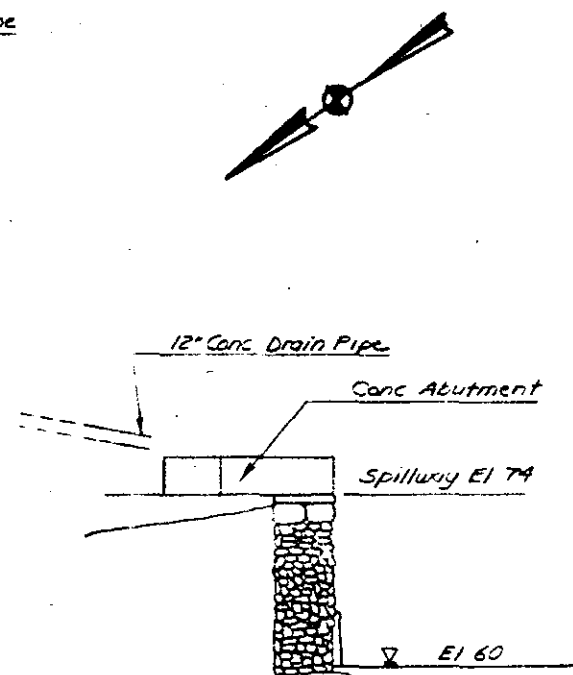
D	WP	A	R	$R^{2/3}$	$S^{1/2}$	V	Q
2	44	77	1.75	1.45	0.107	3.08	237
5	60	233	3.88	2.47	"	5.24	1,221
8	73	433	5.93	3.28	"	6.95	3,010
10	97	603	6.22	3.38	"	7.17	4,324
15	154	1,231	7.99	4.00	"	8.48	10,439



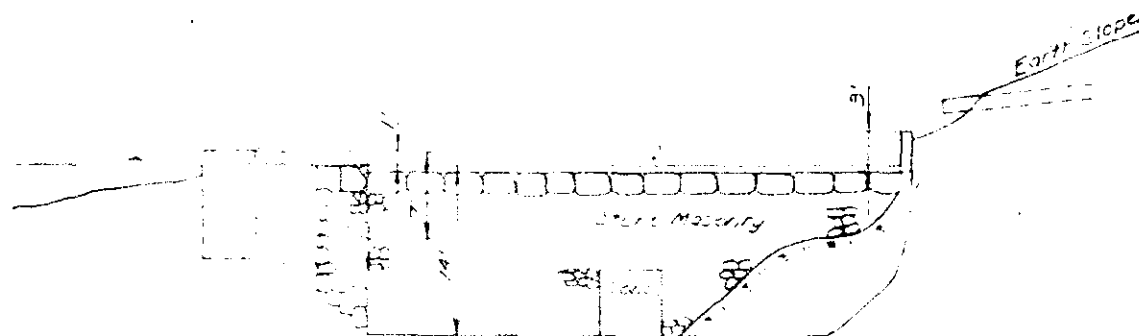
D-5



PLAN



SECTION A-A



ELEVATION

NOT TO SCALE

PLATE 1

STORCH ENGINEERS WETHERSFIELD, CONNECTICUT	US ARMY ENGINEER DIVISION NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.
NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS	
UPPER MILL POND DAM	
SCALE AS SHOWN	
DATE JANUARY, 1981	